

# Portable Test Cell



GARTECH  
Enterprises, Inc.

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## Instruction and Operations Manual

### Portable Test Cell Overview

The primary purpose of the Portable Test Cell is to allow the user the ability to control the engine by starting/stopping and running throttle without the need for OEM connections. The unit is in a self contained carry case and specific harnesses for different applications can be purchased separately. The user can control four different types of throttles which are Analog, Remote, J1939 Datalink, and Frequency. Throttles that require the actuation of Idle Validation switches are also incorporated into the unit.

There are five lamps on the unit that can be connected to an engine control modules drivers. The lamps are Stop, Warning, Maintenance, Water In Fuel, and Wait. When the engine control module turns these lamps on the user can easily see which lamp is being actuated.

Some engine control modules have Intermediate speed controls. These controls can be used with the ISC 1, ISC 2, and INC/DEC switches that are on the panel.

The Portable Test Cell has a large display that the user can view engine parameters that are broadcasted onto the J1939 data bus. The display allows the user to select from 54 different engine or transmission parameters and display up to 4 on the user screen. The ability to view engine or transmission parameters is a highly valuable diagnostic tool which can save many hours of troubleshooting. Along with the engine parameters that are displayed, the user can also scroll out Active, Inactive Diagnostic Fault codes, or display the fault lamps that are being transmitted on the datalink. A special mode will change the fault code monitoring from Engine to Allison transmission faults. In this mode, factory Allison codes will be displayed (Only applicable for Model Year 08 and above).

The user can also setup an alarm output which will trigger on faults or real-time running engine parameters. (Datalink adapter with provided software is needed to setup alarm system).

The Portable Test Cell is the ideal test tool to be able to run an engine without the need to be connected into the OEM system either in test cell environment or in-vehicle.

### Warranty

A limited warranty on workmanship and materials is provided for this product. For more details, contact GarTech Enterprises Inc. at 812-794-4796.

### Supported Engine Parameters

The following list is the parameters that are currently supported with this device. Other parameters may get added for future revisions.

<i>Parameter</i>	<i>SPN</i>	<i>Parameter</i>	<i>SPN</i>
Engine Spd	190	ExhTmp#1	1137
Throttle	91	ExhTmp#2	1138
Pct Load	92	ExhTmp#3	1139
Rmt Throt	974	ExhTmp#4	1140
I.M. Tmp	105	ExhTmp#5	1141
Coolant Tp	110	ExhTmp#6	1142
Fuel Temp	174	ExhTmp#7	1143
Oil Temp	175	ExhTmp#8	1144
F.Rail Prs	157	ExhTmp#9	1145
Boost Prs	102	ExhTmp#10	1146
Coolant Pr	109	ExhTmp#11	1147
Amb Air Pr	108	ExhTmp#12	1148
Fuel Rate	183	ExhTmp#13	1149
Battery SW	158	ExhTmp#14	1150
Battery	168	ExhTmp#15	1151
Blowby Prs	22	ExhTmp#16	1152
Timing Prs	156	Out Sft Spd	191
Engine Hrs	247	In Sft Spd	161
Oil Prs	100	Slect Gear	524
OilFiltPrs	99	Curnt Gear	524
Boost Prs3	1129	Tran Prs	127
ECM Tmp	1136	Tran Temp	177
I.M. Tmp2	1131	Req Gear	525
I.M. Tmp3	1132	Aux Tmp 1	441
I.M. Tmp4	1133	Aux Tmp 2	442
Compln Tp2	1173	Aux Prs 1	1387
Exh Gas Tmp	173	Aux Prs 2	1388

Note: Not all engine control modules broadcast each of these parameters. If you attempt to display a parameter which is not supported or the unit has bad communications, a value of "N/A" will be shown for those parameter values.

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## Main Display

The main display is sectioned off into three areas. Main menu, Fault window, and Bar Graph Gauge window.



Figure 1. Main Display Window

The Main Menu area displays parameters and menu screens and the Bar graph location displays the selected value graphically. The Fault Window contains all fault information.

## Menu Navigation

The menus can all be navigated by using the Up/Down and ENT keys on the keypad that is located below the display.

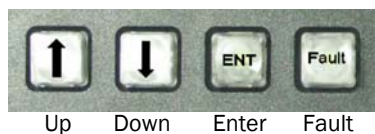


Figure 2. Keyboard

By Pressing the Up or Down key, the arrow located on the left side of the display will move in that direction.



Figure 3: Navigation Arrow

The navigation arrow is shown in a red box in Figure 3. Pressing the "ENT" will open up the corresponding menu that the arrow is pointing to.

## Changing A Value

To change a value or adjust a menu item, select the item by pressing the Up and Down arrow keys and then press "ENT". The menu will appear for that item. For example, pressing the "ENT" key while the arrow is on "This Addr" will display the options for that feature. The following figure depicts this example:



Figure 4: Address Setup Menu Example

Selecting "Back" will take you back to the previous menu. For more details on this menu refer to the "Address Setup" section.

Once the options menu is displayed, as shown in Figure 4, select the item that you want to adjust and press "ENT" again. This will display the menu where the parameter can be adjusted. For example, press "ENT" while the arrow is pointing to "This Addr" to adjust the datalink address for the unit, see Figure 5.



Figure 5. Options Menu Adjustment Screen

The value can be adjusted by pressing the Up/Down keys and finally pressing "ENT" when done adjusting which will display the previous menu. Holding down the Up/Down keys after a few seconds will auto-repeat the key stroke.

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## Fault Codes

All fault codes, active/inactive, can be scrolled out of the fault display window by pressing the “Fault” key. The following is the order of which items can be displayed or scrolled out by pressing the “Fault” key and the format options available:

- Fault Lamps (Default)
  - o Malfunction
  - o Amber
  - o Red
  - o Engine Protection
- Active Faults (press “Fault” Key once)
- Inactive Faults (press “Fault” Key twice)

The available formats that the fault codes can be display are:

- Cummins Codes
- Verbal
- SPN/FMI
- Allison Transmission Codes (MY08 or Greater)

The fault window can be seen in Figure 6.



Figure 6. Fault Window

The faults that are being collected and displayed will be from the engine or transmission. The user can determine this by the text above the Fault window. See figure 7 and 8.



Figure 7. Fault Source for Engine

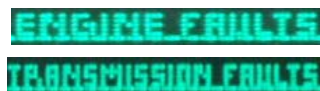


Figure 8. Fault Source Text

Depending on the Fault mode the user has selected, the text for which faults are being monitored are listed in Figure 8.

## Fault Code Options

To access the fault code options, from the main display screen:

From the Main Menu Navigate to:

- ☞ Main Menu
- ☞ Datalink Setup
- ☞ Fault Setup

The fault options are shown in Figure 9. There are three different options that can be set, Fault Decode, Fault Display, and Fault Scroll.

*Fault Decode* – Allows the user to force the unit to decode the engine faults in a different scheme. The selection number corresponds to the decode mode from the J1939 SAE specification. Normally, this is auto-detected and the user will not have to adjust this.

*Fault Display* – Controls how the fault codes are displayed in the fault window. Options are: Cummins, Verbal, and SPN/FMI. This display option is only used when Fault Scroll is set for ENGINE.

*Fault Scroll* – Selects what source the fault codes are received and displayed from in the fault window. The options here are from the Engine or Transmission. Once the user selects which source they would like the faults to come from, the main screen will update stating the location. See Figure 7.



Figure 9. Fault Options

## Address Setup

The unit must look for specific addresses so the proper messages on the datalink can be decoded. The address for the unit must also be set so it can request a number of items directly from the engine or transmission controllers. The address setup can be accessed by navigating the following sequence:

From the Main Menu Navigate to:

- ☞ Main Menu
- ☞ Datalink Setup
- ☞ Address Setup

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## Address Setup contd.

The address setup options are shown in Figure 10. There are three different options that can be set, This Addr, Engine Addr, and Transmission Addr. The addresses that are displayed on the screen are in Hexadecimal values.

*This Addr* – Sets the datalink address for the display. Adjust this value if there is a conflict with this device and another device on the network.

*Engine Addr* – Sets the datalink address for the Engine controller. Typically, engine's have an address of "0".

*Transmission Addr* – Sets the datalink address for the transmission controller. Typically, transmissions have an address of "3".



Figure 10. Address Options

## Other Options

The user can change the Display Units, Display Mode, Clear Inactive Fault Codes, and Setup the bar graph gauge through this menu. The Other Options can be accessed by navigating the following sequence:

From the Main Menu Navigate to:

- ☞ Main Menu
- ☞ Other Options



Figure 11. Other Options

The options that are shown in Figure 11 are:

*Display Units* – Changes the engineering units for the data that is displayed. The user can select ENGLISH or METRIC.

*Display Mode* – Changes the names of the parameters that are displayed. The user can select SAE, C\_OLD (Cummins Old naming), or C\_NEW (Cummins New naming).

## Other Options contd.

*Clear Inactive Faults* – Sends a message to the engine controller to clear all Inactive faults. Not all engine controllers respond to this message.

*Setup Gauge* – Allows the user to setup the bar graph on the Main Display. The high and low limit can be adjusted along with selecting which parameter uses the bar graph. Figure 12 shows this menu.



Figure 12. Setup Gauge Options

The three options that the user can setup are Value at 100%, Value at 0%, and Select Parameter.

*Value at 100%* - Sets the 100% range of the bar graph in engineering units. In Figure 12, when Engine Speed is at 2000 RPM, the bar graph will be at 100%.

*Value at 0%* - Sets the 0% range of the bar graph in engineering units.

*Select Parameter* – Allows the user to select which parameter they would like to be used for the bar graph.

## Set Brightness

The user can change the brightness of the display. The brightness option can be accessed by navigating the following sequence:

From the Main Menu Navigate to:

- ☞ Main Menu
- ☞ Set Brightness



Figure 13. Set Brightness

There are four different settings of brightness for the display. The default value is 4 and it's the maximum brightness.

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## Display User Screen

Selecting this option from the menu will display the parameter screen. The four parameters are displayed on the screen.



Figure 14. Parameter Screen

The parameters can be changed by moving the arrow to the location that needs to be changed. Once the arrow is pointing to the location that needs to be changed, press the “ENT” key and then use the Up/Down arrows to pick the parameter. When the parameter that needs to be displayed is listed, simply press the “ENT” key again to set it. As the parameter name changes, the value will automatically update. If that parameter is not currently being broadcast then the symbol N/A will be displayed. Figure 15 displays what the screen looks like when the user is changing parameters.



Figure 15. Changing Parameters



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## Portable Test Cell Interface

The Portable Test Cell unit has switches, lamps, and knobs to control the engine. There are five sections on the panel that provide different functions. The sections include Display, Lamps, ISC, Power, and Throttles.

*Display* – Allows viewing of datalink parameters and allows the user to setup the unit. Includes the four button keypad below the display. See Figure 16.



Figure 16. Display Interface

*Lamps* – Includes five separate lamps that are connected to the engine controller's output drivers. These lamps represent the following functions: Stop, Warning, Maintenance, Water In Fuel (WIF), and Wait. When the engine controller drives these lamps on, they will illuminate on the panel. See Figure 17.



Figure 17. Lamp Interface

*ISC* – The ISC switches allow the user to select an alternate speed if the engine controller supports this feature. See Figure 18.



Figure 18. ISC Switches

## Portable Test Cell Interface contd.

*Power* – Controls the power of the Portable Test Cell unit and also the engine control unit that it is connected to. The Power button will turn the power on for the Portable Test Cell unit. Press and hold this button for one second to turn the unit on. The Keyswitch will turn On/Off the key input for the engine control unit. The Start button engages the starter solenoid. See Figure 19.



Figure 19. Start/Key/Power Switches

*Throttles* – The Portable Test Cell can control up to four different types of throttles. There are four different control knobs on the interface panel that allow the user to adjust the throttle. Three of the throttles, Remote, J1939, and Frequency need to be Enabled before the user can use them. The three switches directly above the control knobs will enable these features. See Figure 20.

To setup the options for these throttles, see Portable Test Cell Throttle setup section.



Figure 20. Throttle Interface

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## Analog Throttle Setup

The Analog throttle simulates a throttle pedal that would be mounted inside a vehicle cab. There are two associated switches that get activated by this throttle. The two switches are for Idle Validation. The two switches will change from an On to Off state and they are opposite from each other. To adjust the Analog throttle options, move the Arrow on the display to Analog Throttle and press "ENT" button. See Figure 21.



Figure 21. Analog Throttle Setup

There are four different options that the user can setup for this throttle. All voltages are in Volts.

*Volts at 100%* – The voltage sent to the engine control module when the control knob is turned fully clockwise.

*Volts at 0%* – The voltage sent to the engine control module when the control knob is turned fully counter-clockwise. In most applications, there is a 0.5 Volt offset.

*Volts for IVS* – This setting is the voltage point where the Idle Validation switches will switch states, signaling the engine control module that throttle is moving.

*Select For Gauge* – Connects the bar graph on the display to show the throttle value. See the Other Options section on how to setup the bar graph correctly.

## Remote Throttle Setup

The Remote throttle simulates a remote throttle pedal that would be used outside of a vehicle cab. The Enable switch must be toggled up for this throttle to operate, see Figure 20. There are no associated Idle Validation switches with this throttle. To adjust the Remote throttle options, move the Arrow on the display to Remote Throttle and press "ENT" button. See Figure 22.



Figure 22. Remote Throttle Setup

There are three different options that the user can setup for this throttle. All voltages are in Volts.

## Remote Throttle Setup contd.

*Volts at 100%* – The voltage sent to the engine control module when the control knob is turned fully clockwise.

*Volts at 0%* – The voltage sent to the engine control module when the control knob is turned fully counter-clockwise. In most applications, there is a 0.5 Volt offset.

*Select For Gauge* – Connects the bar graph on the display to show the throttle value. See the Other Options section on how to setup the bar graph correctly.

## J1939 Throttle Setup

The J1939 is a datalink throttle that sends the appropriate messages to the engine controller. The knob position is converted into data that is periodically transmitted. The Enable switch must be toggled up for this throttle to operate, see Figure 20. There are no associated Idle Validation switches with this throttle. To adjust the J1939 throttle options, move the Arrow on the display to Remote Throttle and press "ENT" button. See Figure 23.



Figure 23. J1939 Throttle Setup

There are four different options that the user can setup for this throttle.

*RPM at 100%* – Sets the RPM value that will be transmitted to the engine controller when the control knob is turned fully clockwise.

*RPM at 0%* – The RPM value that will be transmitted to the engine controller when the control knob is turned fully counter-clockwise.

*Source Address* – This is the datalink address that the message uses to send out the throttle data. The engine controller must have the ability to allow this address to control the engine speed message. The Source Address is displayed in Hexadecimal values.

*Select For Gauge* – Connects the bar graph on the display to show the throttle value. See the Other Options section on how to setup the bar graph correctly.

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## Frequency Throttle Setup

The Frequency throttle sends a 50% duty cycle frequency signal to the engine control module. The Enable switch must be toggled up for this throttle to operate, see Figure 20. To adjust the Frequency Throttle options, move the Arrow on the display to Remote Throttle and press "ENT" button. See Figure 24.



Figure 24. Frequency Throttle Setup

There are three different options that can be setup for this throttle. All values are in Hertz.

*Freq at 100%* - The frequency sent to the engine control module when the control knob is turned fully clockwise.

*Freq at 0%* - The frequency sent to the engine control module when the control knob is turned fully counter-clockwise.

*Select For Gauge* - Connects the bar graph on the display to show the throttle value. See the Other Options section on how to setup the bar graph correctly.



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## Electrical Specifications

Input Voltage:	6-28 Volt DC
Operating Current:	1.5 Amp
Inrush Current:	2.5 Amp
Operating Temperature:	-40 to 80 Deg C

## Electrical Connections

The Portable Test Cell version contains harnesses that are required to connect the device to the engine. Please refer to the harness instruction manual to connect these properly.

The Digital Dash has only one connection that is required. A 6 pin Deutsch connector is used on the back of the device with the following pin out:

Pin 1:	Battery + (6-28 V DC)
Pin 2:	CAN HI
Pin 3:	CAN LO
Pin 4:	CAN SHIELD
Pin 5:	Alarm Output
Pin 6:	Ground

## PC Software

The Alarm feature for Portable Test Cell can be set by using the provided software along with a Peak adapter. This adapter can be purchased from GarTech Enterprises Inc.

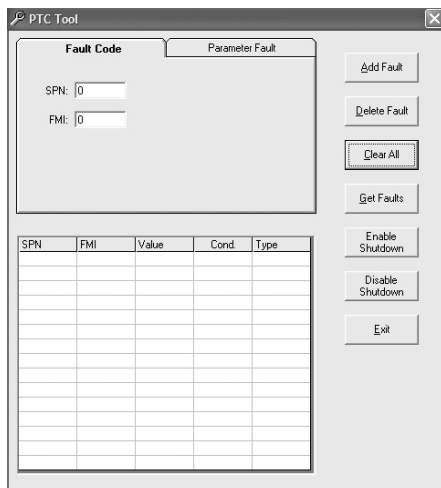


Figure 25: PC Software for Alarm Feature

## PC Software cont.

The two tabs located in the top left corner allow the user to select between an alarm from a fault code or an alarm from a parameter value. The fault code alarm simply looks for the specified SPN/FMI combination and sets the alarm. The parameter value will determine if the condition is met before setting the alarm.

The user can add a fault by setting the items in either "Fault Code" tab or the "Parameter Fault" tab and then pressing "Add Fault" button. If there is room left in the fault table then that new fault condition is added.

The user can delete a fault that is in the fault table by first input the exact items into the "Fault Code" tab or "Parameter Fault" tab and then clicking "Delete Fault". If there is a fault that is the exact same one in the device then its deleted.

The "Get Faults" button will request the current fault list from the device and display it in the bottom grid.

The user can clear the entire fault table in the device by simply clicking "Clear All".

This feature has to be enabled by default which can be done by clicking "Enable Shutdown" button. To disable this feature click on "Disable Shutdown".

When this feature is enabled and a fault condition occurs a screen on the device will display which fault condition was tripped. The user will have to press the "Ent" key to resume normal device operations. This will also reset the alarm output driver.

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